

## **MOVING FORWARD WITH SILAGE HYBRID EVALUATION**

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Our corn hybrid evaluation program for corn silage at Penn State began in 2001 to develop a corn hybrid evaluation program with the objective of meeting industry and producer needs. We developed a partnership with the Professional Dairy Managers of Pennsylvania and initiated an advisory team that consisted of seed industry representatives, dairy nutritionists, and dairy producers. We also have partnered with a commercial laboratory to provide their perspective on forage analysis techniques. Currently that laboratory is Cumberland Valley Analytical Services in Waynesboro Pennsylvania. One of the challenges we have encountered is the lack of consistency in the industry in the evaluation of corn silage quality and interpretation. In this presentation, we will discuss some of the foundations of our program and the directions for the future.

One objective of our program is to provide data from multiple environments over multiple maturity zones that exist in our state. Currently we have three maturity zones with at least three locations in each zone. We also strive to evaluate hybrids under the conditions that they are grown under. For us, this is often manured, following corn and no-till planting on dairy farms. At times this is challenging because these are often not the most uniform conditions. When we report our data, we separate hybrids into submaturity groups in each test and then sort by dry matter content at harvest. We encourage users to compare hybrids within these submaturity groups. This helps to reduce the impact of maturity on hybrid selection.

Our basic report has included yield and dry matter along with NIR based crude protein, NDF, NDFD (24 Hour) Starch, NEL, lignin, fat, and ash. For evaluation of BMR hybrids, we use wet chemistry based NDFD since we have found a better discrimination among BMR genes with the wet chemistry and approach and this has been confirmed by our laboratory partner. As we move forward we are making some changes in our program and have started to include some of the concepts addressed below.

In the past several years we have engaged with our advisory board to evaluate some new directions in corn silage evaluation. In addition we have engaged in discussions with other testing programs in the northeast at Cornell, Miner Institute, Western New York Crop Management Association and the University of Vermont. We have agreed to work together to develop new approaches together and strive for more consistency in our approach to corn silage evaluation. Based on these interactions we have focused on several areas to try to move forward with our forage analyses and interpretation. These included advanced fiber digestibility measurements, starch digestibility, and use of improved methods for interpretation of yield and quality data.

Several research efforts have suggested that evaluation of multiple time points of fiber digestibility could provide more insight into intake differences among forages and would be a better predictor of dry matter intake than NDFD. This has resulted in more laboratories offering a measurement of undigestible NDFD or uNDF that is based on the residue remaining after a 240 hour incubation and have developed NIR equations to predict this variable. Some laboratories have shown a large range in uNDF in corn silage samples and this is being incorporated as an input into dynamic dairy nutrition models such as CNCPS. Because of this need, our group has decided to incorporate uNDF in our evaluations. Our initial evaluations suggest that there are differences due to hybrid and environment due to uNDF and that there can be a significant range of for uNDF at a given NDFD level.

We have also been encouraged to evaluate starch digestibility differences among hybrids. We know that other factors such as particle size, moisture, the time in the silo can all have a significant effect. Our team has been working to identify the appropriate grind size to achieve the best repeatability to sort out hybrid differences to better reflect in situ starch digestibility. This year we plan to evaluate starch digestibility in several of our trials with a 1mm grind based on the results from a preliminary study conducted during the past two years. This will provide us with some replicated data across a range of hybrids in three different tests.

Developing better methods for interpreting silage yield and quality data is needed. Our advisory group has expressed concern about the use of Milk 2006 as a tool to predict potential milk production or profitability. A key concern is its sensitivity to fiber digestibility and may not fully account for improved intake and resulting milk production from some hybrids. Also, it is not possible to incorporate uNDF measurements in the prediction.

An alternative method for predicting milk response would be to use a dynamic rumen model such as CNCPS 6.5.5 to estimate potential milk differences among hybrids. Our Cornell partners used this approach in their program in 2016. They calculated estimated ME allowable milk yields for each hybrid using either a standard dry matter intake or a dry matter intake based on the uNDF240. They used a base ration with 28 lbs DM of corn silage and replaced each hybrid into the ration to calculate the individual values. When intakes were based on the uNDFD240, this resulted in potential milk differences among the hybrids up to nearly 20 lbs/day at one location. Our assessment is that these differences in estimated milk production seems a bit high and perhaps the model needs to be recalibrated. Nevertheless, we think the approach has merit and look forward to evaluating it in the future. Our hope is that a streamlined approach can be developed, based on model output, that can be used in a spreadsheet format.

This illustrates another goal of our programs which is not just to compare hybrids but to work together to develop approaches for hybrid testing that can be adopted by seed companies and others interested in evaluating corn hybrids for silage. Another objective is to use our programs as a platform for evaluations of other characteristics of

corn silage across hybrids. We are completing a study of fatty acid composition of commercial hybrids as one example. Cornell will be evaluating mycotoxin differences in a satellite study this year. We both hope to study environmental effects on hybrid performance more in the future and if we have some similarities in our protocols, we should be able to combine data across more environments than we were able to in the past.

## REFERENCES

Penn State Corn Silage Testing Program:

<http://extension.psu.edu/plants/crops/grains/corn/hybrid-tests/pa-commercial-grain-and-silage-hybrid-corn-tests-report-2016-results/silage>

Cornell Corn Silage Variety Trials: <https://scs.cals.cornell.edu/extension-outreach/field-crop-production/variety-trials#corn-silage>